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EXAMINER
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ART UNIT	PAPER NUMBER
2189	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application N .	Applicant(s)	
	09/730,780	PORTERFIELD, A. KENT	
	Examiner	Art Unit	
	Christopher E. Lee	2189	

-- The MAILING DATE of this c mmunicati n appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 January 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-60* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-60* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2,3* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Specification

1. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

2. The disclosure is objected to because of the following informalities:

Fill application numbers in the blanks on pages 12, 17, 19 and 22.

Appropriate correction is required.

Claim Objections

3. Claims 10, 28, 45 and 55 is objected to because of the following informalities:

The claims 10, 28 and 45 recite the preambles "the method of 6" in line 1 of the claim 10, "the method of 24" in line 1 of the claim 28, and "the system of 42" in line 1 of the claim 45, respectively. However, it is not clear to claim if the numbers in the preamble points out their parent claims, respectively. The Examiner assumes the numbers in the preambles of the claims 10, 28 and 45 are pointing out their parent claims, respectively, for the purpose of the claim rejections based on a prior art.

The claims 10, 28 and 45 recite the subject matter "the group" in line 2, respectively. However, the subject matter "the group" in line 2 of the claims 10, 28 and 45 could not be the same subject matter "the group" in line 2 of their parent claims 6, 24 and 42, respectively, because the subject matter "the group" in line 2 of the claims 10, 28 and 45 are clearly different from the subject matter "the group" in line 2 of their parent claims 6, 24 and 42, respectively, in light of the claimed invention. Thus, the subject matter "the group" in line 2 of the claims 10, 28 and 45 could be considered as --a group--, respectively.

The claim 55 recites the limitation "said arbitration signals are time multiplexed" in lines 1-2. However, the parent claim 51 recites the subject matter "arbitration signal" is defined as a singular

element, not a plurality of elements. Thus, it could be considered as --said arbitration signal is time multiplexed--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 3, 4, 6, 21, 22, 24, 36, 37, 42 and 46-50 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims 3, 4, 6, 21, 22, 24, 36, 37 and 42 recite the limitation "the group" in line 2, respectively. There is insufficient antecedent basis for this limitation in the claim. Therefore, the term "the group" could be considered as --a group-- since it is not clearly defined in the claims.

The claims 46-50 recite the subject matters "the bus master arbitration request", "the bus slave arbitration request", "the bus master transfer in progress state", and "the bus slave transfer in progress state" in the associated claims, respectively. There is insufficient antecedent basis for these subject matters in the associated claims, respectively. Therefore, the Examiner assumes the claims are dependent claims of the claim 45 in order to reject the claims based on a prior art.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-15, 18, 34-38, 41-50 and 57-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo et al. [US 6,539,444 B1; hereinafter Kondo] in view of Frame et al. [US 5,349,690 A; hereinafter Frame].

Referring to claims 1 and 34, Kondo discloses a bus arbitration method (See Fig. 2 and col. 4, line 48 through col. 5, line 10) for a processor based system (Fig. 12), said system comprising a hub device, which is a link hub (i.e., bus adapter 4 in Fig. 12) coupled to a processor (i.e., processor 1 in Fig. 12) by a processor bus (i.e., processor bus 3 in Fig. 12) and coupled to a memory device (i.e., main memory 2 in Fig. 12) by a memory bus (i.e., memory bus 11 in Fig. 12), said hub device being connected to a first device, which is a satellite device (i.e., any one of module #1, #2, #3,... ; e.g., module #1 6 in Fig. 12) by a link bus (i.e., system bus 5 in Fig. 12), said method comprising the steps of issuing, from one of said first device and said hub device, an arbitration request on said link bus (i.e., requesting a bus mastership of a system bus from a module, e.g., module #1 in Fig. 2; See col. 4, lines 62-63); and granting control of said link bus (i.e., system bus) to said device issuing said arbitration request (i.e., module #1 in Fig. 2), wherein control of said link bus is granted by said hub device (i.e., bus adapter 4 in Fig. 12). Kondo does not expressly teach the steps of determining, at said first device and said hub device, whether control of said link bus can be transferred to said device issuing said arbitration request; and if it is determined that control of said link bus can be transferred, granting control of said link bus to said device issuing said arbitration request, wherein control of said link bus is granted by said first device and said hub device.

Frame discloses a fair arbitration scheme (See Abstract), wherein determining (i.e., determining which enabled node has the highest priority), at a first device (e.g., node 12 in Fig. 1) and a hub device (e.g., node 16 in Fig. 1), whether control of a link bus (i.e., use the interconnect bus 10 in Fig. 1) can be transferred to said device issuing an arbitration request (i.e., enabled message node 12 in Fig. 1; See col.2, lines 29-44); and if it is determined that control of said link bus can be transferred (See col. 2, lines 45-

51), granting control of said link bus to said device issuing said arbitration request (i.e., allowing the node 12 to use the interconnect bus; See Abstract), wherein control of said link bus is granted by said first device and said hub device (See col. 2, lines 45-46; i.e., wherein in fact that the nodes 12-18 determine which of the nodes 12 and 16 wins the control of the bus in the arbitration block in Fig. 2 clearly implies control of said link bus is granted by said first device and said hub device).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included said fair arbitration scheme, as disclosed by Frame, in said method steps of said bus arbitration, as disclosed by Kondo, for the advantage of providing all of said devices (i.e., nodes) connected to said link bus (i.e., interconnected bus) have an equal opportunity to use said bus, but without inefficiencies created by reserving time for each device to use said bus (See Frame, col. 1, lines 50-54).

Referring to claims 2 and 35, Frame teaches said first device, which is said satellite device, and said link hub (i.e., node 12 and node 16 in Fig. 1) determine if control of said link bus should be transferred by inspecting respective internal arbitration state (i.e., monitoring bus idle state 40, wait phase 48, selection 50 and transfer phase 52 in Fig. 2) and status information (i.e., arbitration loser, arbitration winner status of enabled message node or disabled message node; See col. 2, lines 45-55 and col. 3, lines 21-66), and determining if control of said link bus can be transferred based on said inspected internal arbitration state and status information (See Abstract).

Referring to claims 3 and 36, Frame teaches said internal arbitration state information comprises a current arbitration state (i.e., arbitration phase) selected from a group consisting of a park state (i.e., bus idle state 40 in Fig. 2) indicating that there are no requests on said link bus (See col. 3, lines 28-31), grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) indicating that a device (i.e., node) in control of said link bus is transferring information on said link bus, and a grant-other state (i.e., wait phase 48 in Fig. 2) indicating that another device is in control of said link bus (i.e., the current node loses the control of the bus, the another node wins the control of the bus; See col. 2, lines 45-68).

Referring to claims 4 and 37, Frame teaches said internal status information comprises a current status value (i.e., current status of node) selected from a group consisting of a bus master arbitration request (i.e., arbitration request at t_2 after transfer completion at t_1; See col. 3, lines 45-47), bus master transfer in progress (i.e., reselected arbitration request at t_2 and transfer phase at t_2 after transfer completion at t_1; See col. 3, lines 54-66), bus slave arbitration request (i.e., arbitration request at t_1 from enabled message nodes 12 and 16 in Fig. 1 via enabled path 42 of Fig. 2; See col. 3, lines 36-53), and bus slave transfer in progress (i.e., selected arbitration request at t_1 and transfer phase at t_1).

Referring to claims 5 and 41, Frame teaches said granting step comprising modifying internal arbitration state and status information (i.e., modifying arbitration phases, such that wait phase 48, selection phases 50, transfer phase 52, etc in Fig. 2) to reflect that said issuing device is a master of said link bus (i.e., winning node to control the bus) and that the other device connected to said link bus is a slave of said link bus (i.e., losing node not to control the bus; See col. 3, lines 21+).

Referring to claims 6 and 42, Frame teaches said internal arbitration state information comprising a current arbitration state (i.e., arbitration phase) selected from a group consisting of a park state (i.e., bus idle state 40 in Fig. 2) indicating that there are no requests on said link bus (See col. 3, lines 28-31), grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) indicating that a device (i.e., node) in control of said link bus is transferring information on said link bus, and a grant-other state (i.e., wait phase 48 in Fig. 2) indicating that another device is in control of said link bus (i.e., the current node loses the control of the bus, the another node wins the control of the bus; See col. 2, lines 45-68).

Referring to claims 7 and 43, Frame teaches said modifying step comprising at said first device (i.e., node 12 in Fig. 1), changing said internal arbitration state to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2); and at said hub device (i.e., node 16 in Fig. 1), changing said internal arbitration state to said grant-other state (i.e., wait phase 48 in Fig. 2; See col. 3, lines 21-53).

Referring to claims 8 and 44, Frame teaches said modifying step comprising at said hub device (i.e., node 16 in Fig. 1), changing said internal arbitration state to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2); and at said first device (i.e., node 12 in Fig. 1), changing said internal arbitration state to said grant-other state (i.e., wait phase 48 in Fig. 2; See col. 3, lines 21-53).

Referring to claim 9, Frame teaches said modifying step comprising at said first device (i.e., node 12 in Fig. 1), changing said internal arbitration state from said park state (i.e., bus idle state 40 in Fig. 2) to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2); and at said hub device (i.e., node 16 in Fig. 1), changing said internal arbitration state from said park state (i.e., bus idle state 40 in Fig. 2) to said grant-other state (i.e., wait phase 48 in Fig. 2; See col. 3, lines 21-53).

Referring to claims 10 and 45, Frame teaches said internal status information comprises a current status value (i.e., current status of node) selected from a group consisting of a bus master arbitration request (e.g., arbitration request from enabled message node 14 and 16 in Fig. 1 via enabled path 42 of Fig. 2, i.e., enabled arbitration status; See col. 3, lines 1-3), bus master transfer in progress (i.e., transfer phase 52 after the node is selected as an arbitration winner), bus slave arbitration request (e.g., path 44 of Fig. 2 for disabled message node 12 in Fig. 1, i.e., disabled arbitration status; See col. 3, lines 5-8), and bus slave transfer in progress (i.e., wait phase 48 after the node is lost the bus control; a data transfer on the bus is controlled by another node).

Referring to claims 11 and 46, Frame teaches said internal arbitration state is changed from said park state (i.e., bus idle state 40 in Fig. 2) to said grant-other state (i.e., wait phase 48 in Fig. 2) if said internal status reflects said bus master arbitration request (i.e., an arbitration request at t_2 after transfer completion at t_1) and not said bus slave arbitration request (i.e., not an arbitration request at t_1 from enabled message nodes). Refer to col. 3, lines 45-47, i.e., wherein in fact that after the transfer involving node 12 has been completed, it too is disabled and must wait until the bus is idle for 1600 nsec (t_2) implies

that said internal arbitration state is changed from said park state to said grant-other state if said internal status reflects said bus master arbitration request and not said bus slave arbitration request.

Referring to claims 12 and 47, Frame teaches said internal arbitration state is changed from said park state (i.e., bus idle state 40 in Fig. 2) to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) if said internal status reflects said bus slave arbitration request (i.e., arbitration request at t_1 from enabled message nodes, and the highest priority node wins to control the bus; See col. 3, lines 42-45).

Referring to claims 13 and 48, Frame teaches said internal arbitration state is changed from said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) to said grant-other state (i.e., wait phase 48 in Fig. 2) if said internal status reflects said bus slave arbitration request (i.e., arbitration request at t_1 from enabled message nodes) and not said bus slave transfer in progress state (i.e., after completion the bus slave transfer in progress state, caused by a selected arbitration request at t_1 and transfer phase at t_1). Refer to col. 3, lines 45-47.

Referring to claims 14 and 49, Frame teaches said internal arbitration state is changed from said grant-other state (i.e., wait phase 48 in Fig. 2) to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) if said internal status reflects said bus slave arbitration request (i.e., an arbitration request at t_1 from enabled message nodes, which has been waiting in wait phase 48 in Fig. 2) and not said bus master transfer in progress state (i.e., after completion the transfer phase at t_2, caused by a reselected arbitration request at t_2 after transfer completion at t_1). See Fig. 2 and col. 3, lines 21+ for the operation of the fair arbitration scheme.

Referring to claims 15 and 50, Frame teaches said internal arbitration state is changed from said internal arbitration state is changed from said grant-other state (i.e., wait phase 48 in Fig. 2) to said park state (i.e., bus idle state 40 in Fig. 2) if said internal status does not reflect said bus master arbitration request (i.e., no arbitration request at t_2 after transfer completion at t_1), said bus slave arbitration request

(i.e., no arbitration request at t_1 from enabled message nodes) and said bus master transfer in progress state (i.e., no reselected arbitration request at t_2 and transfer phase at t_2 after transfer completion at t_1). Refer to col. 3, lines 45-47, i.e., wherein in fact that after the transfer involving node 12 has been completed, it too is disabled and must wait until the bus is idle for 1600 nsec (t_2) implies that said internal arbitration state is changed from said internal arbitration state is changed from said grant-other state to said park state if said internal status does not reflect said bus master arbitration request, said bus slave arbitration request and said bus master transfer in progress state, i.e., said internal arbitration state is changed from said internal arbitration state is changed from said grant-other state to said park state if the bus is not busy.

Referring to claim 18, Kondo teaches said issuing step through said granting step are performed in accordance with a link bus protocol (i.e., bus protocol of acknowledge type; See col. 5, lines 55-57) of said link bus (See col. 4, line 48 through col. 5, line 10).

Referring to claim 38, Kondo teaches said link bus (i.e., system bus 5 in Fig. 12) is a source strobed bus (i.e., source clock signal bus; See col. 1, lines 59-64).

Referring to claim 57, Kondo discloses a processor based system (Fig. 12) comprising: a processor (i.e., processor 1 in Fig. 12); a first device (e.g., bus adapter 4 in Fig. 12) connected to said processor by a first bus (i.e., processor bus 3 in Fig. 12); a second device (e.g., module #1 6 in Fig. 12); and a link bus (i.e., system bus 5 in Fig. 12) connected between said first and second devices (See Fig. 12), said link bus comprises a source strobed command/address/data bus (i.e., CAD[0-8] with source clock signal SCLK 203 and LC 206 in a system bus 5 in Fig. 2; See col. 1, lines 59-64), two clock strobes (i.e., SCLK 203 for strobing a source clock and LC 206 for strobing a last cycle in Fig. 2) and a link bus status line (i.e., ACK[0-2] 205 in Fig. 1), said link bus having a link bus protocol (i.e., bus protocol of acknowledge type; See col. 5, lines 55-57), wherein said first and second devices arbitrate control over said link bus and in accordance with said link bus protocol (See col. 4, line 48 through col. 5, line 10).

Kondo does not teach said arbitration is in a decentralized manner.

Frame discloses a fair arbitration scheme (See Abstract), wherein a first device (e.g., node 12 in Fig. 1) and a second device (e.g., node 16 in Fig. 1) arbitrate control over a link bus (i.e., interconnect bus 10 in Fig. 1) in a decentralized manner (See Fig. 1; i.e., each one of nodes has a separate arbitrator and monitor and enabler shows said arbitration is in a decentralized manner) and in accordance with a link bus protocol (i.e., fair arbitration; See col. 2, line 45 through col. 3, line 8).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied said arbitration scheme, as disclosed by Frame, to said method steps of said bus arbitration, as disclosed by Kondo, for the advantage of reducing inefficiencies created by reserving time each device (i.e., node) to use said link bus (i.e., interconnection bus), achieved by the provision of the method for selecting a particular device (i.e., node) from a plurality of devices (i.e., nodes) connected to said link bus to allow said device to use said link bus (See Frame, col. 1, lines 50-58).

Referring to claim 58, Kondo teaches said link bus status line (i.e., ACK[0-2] 205 in Fig. 1) is a tristate status line (i.e., three states on respective signal lines of ACK[0-2] presenting said link bus status).

Referring to claim 59, Kondo teaches said first device is a link hub (i.e., bus adapter 4 in Fig. 12) and said second device is a satellite device (i.e., module #1 6 in Fig. 12).

Referring to claim 60, Kondo teaches said first and second devices are satellite devices (e.g., modules MODULE #1 6 and MODULE #3 8; i.e., said first and second devices are satellite devices coupled to each other by system bus 5 and coupled to processor 1 via bus adapter 4 and processor bus 3 in Fig. 12).

8. Claims 19-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo [US 6,539,444 B1] in view of Frame [US 5,349,690 A] and Nguyen et al. [US 5,502,821 A; hereinafter Nguyen].

Referring to claim 19, most of the claim limitations have already been discussed / addressed with respect to claim 1, with the exception of said link bus being a source strobed bus having a status line, and the steps of said method further comprising: time-multiplexing, from one of said satellite device and said hub device, an arbitration request signal on said link bus status line; and detecting, at the other of said satellite device and said hub device, said arbitration request signal.

Kondo further teaches said link bus (i.e., system bus 5 in Fig. 12) being a source strobed bus (i.e., source clock signal bus; See col. 1, lines 59-64).

Kondo, as modified by Frame, does not teach said link bus having a status line, and the method steps of time-multiplexing, from one of said satellite device and said hub device, an arbitration request signal on said link bus status line; and detecting, at the other of said satellite device and said hub device, said arbitration request signal.

Nguyen discloses a method of determining devices requesting the transfer of data signals on a bus (See Abstract), wherein a link bus (i.e., local bus 10 in Fig. 2) having a status line (i.e., bus request line 88 in Fig. 5, which is within control line 28 in Fig. 2; See col. 6, lines 16-17), and the method steps of time-multiplexing, from one of a satellite device (e.g., device 14-1 in Fig. 2) and a hub device (e.g., local bus controller 12; i.e., bus request signal from device 14-1 in Fig. 2), an arbitration request signal (i.e., a single bus request signal 88-1 in Fig. 2) on said link bus status line (See col. 6, lines 56-60); and detecting (i.e., matching and determining), at the other of said satellite device and said hub device (i.e., local bus controller 12 in Fig. 1), said arbitration request signal (See col. 6, lines 18-25).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included said status line with said multiplexing scheme, as disclosed by Nguyen, in said link bus of said computer system, as disclosed by Kondo, as modified by Frame, so as to convey information about the readiness of said devices' components, e.g., transmitting/receiving data buffers, which is taught by Nguyen at col. 6, lines 56-59.

Referring to claim 20, Frame teaches inspecting internal arbitration state (i.e., monitoring bus idle state 40, wait phase 48 and transfer phase 52 in Fig. 2) and status information (i.e., arbitration loser, arbitration winner status of enabled message node or disabled message node; See col. 2, lines 45-55 and col. 3, lines 21-66) contained on each of said satellite device and said hub device (i.e., each of nodes; See Fig. 1); and determining if control of said link bus can be transferred based on said inspected internal arbitration state and status information (See Abstract).

Referring to claim 21, Frame teaches said internal arbitration state information comprises a current arbitration state (i.e., arbitration phase) selected from a group consisting of a park state (i.e., bus idle state 40 in Fig. 2) indicating that there are no requests on said link bus (See col. 3, lines 28-31), grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) indicating that a device (i.e., node) in control of said link bus is transferring information on said link bus, and a grant-other state (i.e., wait phase 48 in Fig. 2) indicating that another device is in control of said link bus (i.e., the current node loses the control of the bus, the another node wins the control of the bus; See col. 2, lines 45-68).

Referring to claim 22, Frame teaches said internal status information comprises a current status value (i.e., current status of node) selected from a group consisting of a bus master arbitration request (i.e., arbitration request at t_2 after transfer completion at t_1; See col. 3, lines 45-47), bus master transfer in progress (i.e., reselected arbitration request at t_2 and transfer phase at t_2 after transfer completion at t_1; See col. 3, lines 54-66), bus slave arbitration request (i.e., arbitration request at t_1 from enabled message nodes 12 and 16 in Fig. 1 via enabled path 42 of Fig. 2; See col. 3, lines 36-53), and bus slave transfer in progress (i.e., selected arbitration request at t_1 and transfer phase at t_1).

Referring to claim 23, Frame teaches said granting step comprising modifying internal arbitration state and status information (i.e., modifying arbitration phases, such that wait phase 48, selection phases 50, transfer phase 52, etc in Fig. 2) on each of said satellite device (e.g., node 12 in Fig. 1) and said hub device (e.g., node 16 in Fig. 1) to reflect that said issuing device is a master of said link bus (i.e., winning

node to control the bus) and that the other device connected to said link bus is a slave of said link bus (i.e., losing node not to control the bus; See col. 3, lines 21+).

Referring to claim 24, Frame teaches said internal arbitration state information comprising a current arbitration state (i.e., arbitration phase) selected from a group consisting of a park state (i.e., bus idle state 40 in Fig. 2), grant- self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) and a grant-other state (i.e., wait phase 48 in Fig. 2).

Referring to claim 25, Frame teaches said modifying step comprising at said satellite device (i.e., node 12 in Fig. 1), changing said internal arbitration state to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2); and at said hub device (i.e., node 16 in Fig. 1), changing said internal arbitration state to said grant-other state (i.e., wait phase 48 in Fig. 2; See col. 3, lines 21-53).

Referring to claim 26, Frame teaches said modifying step comprising at said hub device (i.e., node 16 in Fig. 1), changing said internal arbitration state to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2); and at said satellite device (i.e., node 12 in Fig. 1), changing said internal arbitration state to said grant-other state (i.e., wait phase 48 in Fig. 2; See col. 3, lines 21-53).

Referring to claim 27, Frame teaches said modifying step comprising at said satellite device (i.e., node 12 in Fig. 1), changing said internal arbitration state from said park state (i.e., bus idle state 40 in Fig. 2) to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2); and at said hub device (i.e., node 16 in Fig. 1), changing said internal arbitration state from said park state (i.e., bus idle state 40 in Fig. 2) to said grant-other state (i.e., wait phase 48 in Fig. 2; See col. 3, lines 21-53).

Referring to claim 28, Frame teaches said internal status information comprises a current status value (i.e., current status of node) selected from a group consisting of a bus master arbitration request (e.g., arbitration request from enabled message node 14 and 16 in Fig. 1 via enabled path 42 of Fig. 2, i.e., enabled arbitration status; See col. 3, lines 1-3), bus master transfer in progress (i.e., transfer phase 52 after the node is selected as an arbitration winner), bus slave arbitration request (e.g., path 44 of Fig. 2 for

disabled message node 12 in Fig. 1, i.e., disabled arbitration status; See col. 3, lines 5-8), and bus slave transfer in progress (i.e., wait phase 48 after the node is lost the bus control; a data transfer on the bus is controlled by another node).

Referring to claim 29, Frame teaches said internal arbitration state is changed from said park state (i.e., bus idle state 40 in Fig. 2) to said grant-other state (i.e., wait phase 48 in Fig. 2) if said internal status reflects said bus master arbitration request (i.e., an arbitration request at t_2 after transfer completion at t_1) and not said bus slave arbitration request (i.e., not an arbitration request at t_1 from enabled message nodes). Refer to col. 3, lines 45-47, i.e., wherein in fact that after the transfer involving node 12 has been completed, it too is disabled and must wait until the bus is idle for 1600 nsec (t_2) implies that said internal arbitration state is changed from said park state to said grant-other state if said internal status reflects said bus master arbitration request and not said bus slave arbitration request.

Referring to claim 30, Frame teaches said internal arbitration state is changed from said park state (i.e., bus idle state 40 in Fig. 2) to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) if said internal status reflects said bus slave arbitration request (i.e., arbitration request at t_1 from enabled message nodes, and the highest priority node wins to control the bus; See col. 3, lines 42-45).

Referring to claim 31, Frame teaches said internal arbitration state is changed from said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) to said grant-other state (i.e., wait phase 48 in Fig. 2) if said internal status reflects said bus slave arbitration request (i.e., arbitration request at t_1 from enabled message nodes) and not said bus slave transfer in progress state (i.e., after completion the bus slave transfer in progress state, caused by a selected arbitration request at t_1 and transfer phase at t_1). Refer to col. 3, lines 45-47.

Referring to claim 32, Frame teaches said internal arbitration state is changed from said grant-other state (i.e., wait phase 48 in Fig. 2) to said grant-self state (i.e., selection phase 50 and transfer phase 52 in Fig. 2) if said internal status reflects said bus slave arbitration request (i.e., an arbitration request at

t_1 from enabled message nodes, which has been waiting in wait phase 48 in Fig. 2) and not said bus master transfer in progress state (i.e., after completion the transfer phase at t_2, caused by a reselected arbitration request at t_2 after transfer completion at t_1). See Fig. 2 and col. 3, lines 21+ for the operation of the fair arbitration scheme.

Referring to claim 33, Frame teaches said internal arbitration state is changed from said internal arbitration state is changed from said grant-other state (i.e., wait phase 48 in Fig. 2) to said park state (i.e., bus idle state 40 in Fig. 2) if said internal status does not reflect said bus master arbitration request (i.e., no arbitration request at t_2 after transfer completion at t_1), said bus slave arbitration request (i.e., no arbitration request at t_1 from enabled message nodes) and said bus master transfer in progress state (i.e., no reselected arbitration request at t_2 and transfer phase at t_2 after transfer completion at t_1). Refer to col. 3, lines 45-47, i.e., wherein in fact that after the transfer involving node 12 has been completed, it too is disabled and must wait until the bus is idle for 1600 nsec (t_2) implies that said internal arbitration state is changed from said internal arbitration state is changed from said grant-other state to said park state if said internal status does not reflect said bus master arbitration request, said bus slave arbitration request and said bus master transfer in progress state, i.e., said internal arbitration state is changed from said internal arbitration state is changed from said grant-other state to said park state if the bus is not busy.

9. Claims 16, 17, 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo [US 6,539,444 B1] in view of Frame [US 5,349,690 A] as applied to claims 1-15, 18, 34-38, 41-50 and 57-60 above, and further in view of Nguyen [US 5,502,821 A].

Referring to claims 16, 17, 39 and 40, Kondo, as modified by Frame, discloses all the limitations of the claims 16, 17, 39 and 40, respectively, except that does not teach said link bus comprises a link bus status line and said arbitration request is issued by propagating a signal, i.e., an arbitration request signal, on said link bus status line in time-multiplexing.

Nguyen discloses a method of determining devices requesting the transfer of data signals on a bus (See Abstract), wherein a link bus (i.e., local bus 10 in Fig. 2) comprises a link bus status line (i.e., bus request line 88 in Fig. 5, which is within control line 28 in Fig. 2; See col. 6, lines 16-17) and an arbitration request (i.e., bus request) is issued by propagating a signal, i.e., an arbitration request signal (i.e., a single bus request signal 88-1 in Fig. 2), on said link bus status line (i.e., bus request line) in time-multiplexing (See col. 6, lines 56-59).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included said status line with said multiplexing scheme, as disclosed by Nguyen, in said link bus of said computer system, as disclosed by Kondo, as modified by Frame, so as to convey information about the readiness of said devices' components, e.g., transmitting/receiving data buffers, which is taught by Nguyen at col. 6, lines 56-59.

10. Claims 51, 52, 55 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo [US 6,539,444 B1] in view of Nguyen [US 5,502,821 A].

Referring to claim 51, Kondo discloses a processor based system (Fig. 12) comprising: a processor (i.e., processor 1 in Fig. 12); a link hub (i.e., bus adapter 4 in Fig. 12) connected to said processor by a first bus (i.e., processor bus 3 in Fig. 12); a satellite device (e.g., module #1 6 in Fig. 12); and a link bus (i.e., system bus 5 in Fig. 12) connected between said link hub and said satellite device (See Fig. 12); and said link bus (i.e., system bus) comprises a link bus status line (i.e., ACK[0-2] 205 in Fig. 1) and having a link bus protocol (i.e., bus protocol of acknowledge type; See col. 5, lines 55-57). Kondo does not teach said satellite device multiplexes an arbitration signal on said link bus status line in accordance with said link bus protocol to become a master of said link bus during transmissions to said link hub and said link hub multiplexes another arbitration signal on said link bus status line in accordance with said link bus protocol to become a master of said link bus during transmissions to said satellite device.

Nguyen discloses a method of determining devices requesting the transfer of data signals on a bus (See Abstract), wherein a satellite device (e.g., device 14-1 in Fig. 2) multiplexes an arbitration signal (e.g., a single bus request signal 88-1 in Fig. 2; See col. 6, lines 56-59) on a link bus status line (i.e., bus request line 88 in Fig. 5, which is within control line 28 in Fig. 2; See col. 6, lines 16-17) in accordance with a link bus protocol (See Fig. 7 and col. 7, lines 11-31; i.e., wherein in fact that the timing relationship between multiplex signal, clock signal and the bus request signal in Fig. 7 implies that said satellite device multiplexes said arbitration signal on said link bus status line in accordance with a link bus protocol) to become a master (i.e., source) of a link bus (i.e., local bus 10 in Fig. 2) during transmissions (i.e., data transfer) to a link hub (e.g., device 14-3 in Fig. 2, i.e., destination) and said link hub (i.e., device 14-3 in Fig. 2) multiplexes another arbitration signal (i.e., a single bus request signal 88-3 in Fig. 2) on said link bus status line (i.e., bus request line 88 in Fig. 5) in accordance with said link bus protocol to become a master (i.e., source) of said link bus during transmissions (i.e., data transfer) to said satellite device (i.e., device 14-1 in Fig. 2, i.e., destination).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included said status line with said multiplexing scheme, as disclosed by Nguyen, in said link bus of said processor based system, as disclosed by Kondo, so as to convey information about the readiness of said devices' components, e.g., transmitting/receiving data buffers, which is taught by Nguyen at col. 6, lines 56-59.

Referring to claim 52, Kondo teaches said link bus (i.e., system bus 5 in Fig. 12) is a source strobed bus (i.e., source clock signal bus; See col. 1, lines 59-64).

Referring to claim 55, Nguyen teaches said arbitration signal (i.e., said single bus request signal 88-1 in Fig. 2) is time multiplexed (See Fig. 7; i.e., multiplex signal for Source Bus Request time or multiplex signal for Destination Bus Request) on said link bus status line (i.e., bus request line 88 in Fig.

5) during a predetermined time window (i.e., during a predetermined time window for Sour Bus Request or Destination Bus Request).

Referring to claim 56, Nguyen teaches said link bus status line (i.e., bus request line 88 in Fig. 5) is used to transmit status information (i.e., to convey bus request signals) between said link hub and said satellite device (See col. 6, lines 40-55).

11. Claims 53 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo [US 6,539,444 B1] in view of Nguyen [US 5,502,821 A] as applied to claims 51, 52, 55 and 56 above, and further in view of Singh et al. [US 6,609,171 B1; hereinafter Singh].

Referring to claim 53 and 54, Kondo, as modified by Nguyen, discloses all the limitations of the claims 53 and 54, respectively, except that does not teach said link bus is one of a quad pumped source strobed bus and a double pumped source strobed bus.

Singh discloses a multi-pumped signaling mode operation (See col. 6, lines 33+), wherein a link bus (i.e., processor bus 117 in Fig. 2) is one of a quad pumped source strobed bus (See col. 6, lines 43+) and a double pumped source strobed bus (See col. 11, lines 14+) according to a multi-pumped signaling mode (See col. 6, lines 33+).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have implemented said means for signaling multi-pumped bus (e.g., strobe generator, strobe signal lines, and multi-pumped signaling mode controller), as disclosed by Singh, on said link bus and its connected devices (i.e., bus adapter and module), as disclosed by Kondo, as modified by Nguyen, for the advantage of increasing bus throughput by operating said link bus in the multi-pumped signaling mode (See Singh, col. 2, lines 39-42).

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Hayek et al. [US 6,442,632 B1] disclose system resource arbitration mechanism for a host bridge.

Silver [US 5,546,587 A] discloses decentralized bus arbitration system which continues to assert bus request signal to preclude other from asserting bus request signal until information transfer on the bus has been completed.

Evett [US 4,402,040] discloses distributed bus arbitration method and apparatus.

Kim et al. [US 5,867,670 A] disclose self-control type bus arbitration circuit and arbitration method therefor.

Williams et al. [US 6,401,142 B1] disclose apparatus and method for selective bus transfer using master and slave modes.

Tavallaei et al. [US 5,907,689 A] disclose master-target based arbitration priority.

Kondo et al. [US 5,428,753 A] disclose method for controlling a bus to progress transfer cycles without inserting a cycle for acknowledgment.

Kalajainen [US 5,132,967 A] discloses single competitor arbitration scheme for common bus.

El-Gohary [US 4,387,425] discloses masterless and contentionless computer network.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher E. Lee whose telephone number is 703-305-5950. The examiner can normally be reached on 9:00am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark H. Rinehart can be reached on 703-305-4815. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

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